EXHIBIT 2

US6952413	Evidence: Belden OWN LTE M12 Router ("The accused product")
5. A multiple access communication method in a mobile station, comprising the steps of:	The accused product which is a mobile station practices a multiple access communication method (e.g., time division multiple access). HIRSCHMANN A BELDEN BRAND  **Part Number:** OWL LTE M12-S20T5A12221GTDBHH LTE, UMTS/HSPA+, GSM/GPRS/EDGE Router with M12 interfaces **Product Description** LTE, UMTS/HSPA+, GSM/GPRS/EDGE Router with M12 interfaces https://catalog.belden.com/techdata/EN/OWL%20LTE%20M12-S20T5A12221GTDBHH_techdata.pdf The accused product has Dual Carrier HSPA+ (also referred to as DC-HSPA+) capability. **Radio technology** Antenna connector: 3 x SMA jack antenna connectors Frequency band: Dual Band GSM (2G): 900/1800 Dual Band UMTS (3G): 900/2100 MHz - FDD-Band (8,1) Penta Band LTE (4G): 800/900/1800/2100/2600 MHz - FDD-Band (20,8,3,7,1) Transmission rate: LTE Cat.4: 150 Mbit/s Download, 50 Mbit/s Upload DC-HSPA+: 42 Mbit/s https://catalog.belden.com/techdata/EN/OWL%20LTE%20M12-S20T5A12221GTDBHH_techdata.pdf Dual carrier HSPA+ has been defined in release 8 as shown below.

	Dual-Carrier HSPA+ 3GPP Release 8 defines dual-carrier or dual-cell high-speed downlink packet access (DC-HSDPA) to allow the network to transmit HSDPA data to a mobile device from two cells simultaneously, doubling achievable downlink data rate to 42 Mbits/s. Dual-carrier operation is characterized as simultaneous reception of more than one HS-DSCH transport channel. Dual-cell operation may be activated and deactivated using HS-SCCH orders. https://www.electronicdesign.com/communications/understanding-hspa-cellular-technology#5

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Technical Specification

Digital cellular telecommunications system (Phase 2+);
Multiplexing and multiple access on the radio path
(3GPP TS 45.002 version 8.1.0 Release 8)

https://www.etsi.org/deliver/etsi_ts/145000_145099/145002/08.01.00_60/ts_145002v080100p.pdf

1 Scope

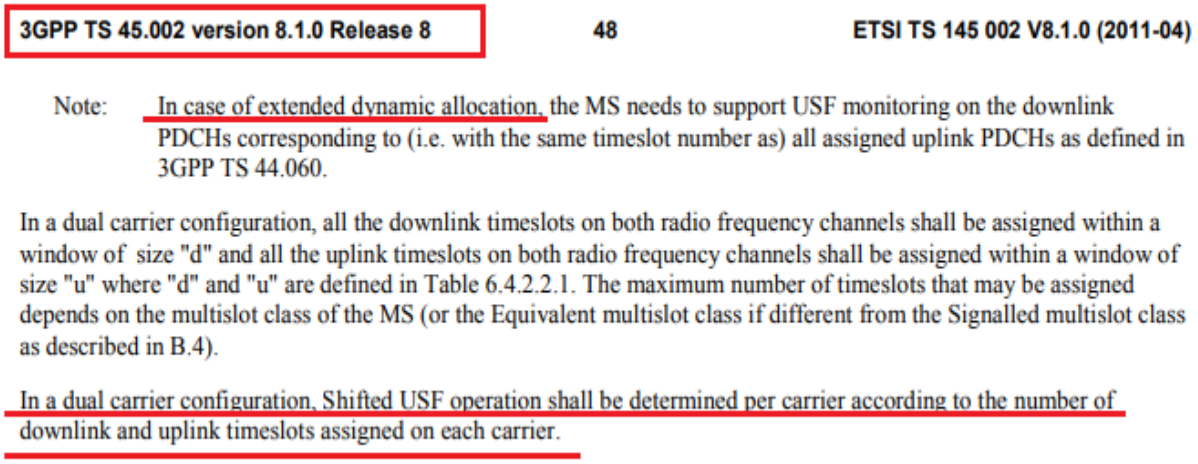
The present document defines the physical channels of the radio sub-system required to support the logical channels. For the Flexible Layer One, it defines the physical channels of the radio sub-system required to support the transport channels. It includes a description of the logical channels, transport channels and the definition of frequency hopping, TDMA frames, timeslots and bursts.

https://www.etsi.org/deliver/etsi_ts/145000_145099/145002/08.01.00_60/ts_145002v080100p.pdf

In addition, The use of shifted USF has been approved in Release 8 (TS 45.002 version 8.1.0), and Release 9 (version 45.002 9.5.0) in combination with dual carrier.

0151	1	A	Rel-8	8.0.0	8.1.0	Clarification of Shifted USF operation in combination with Dual Carrier DL	GP-49	GP-110464	approved	G1	G1-49	GP-110464	agreed	2011-03-03	TEI7	-	2011-03-14
0152	-	-	Rel-9	-	-	Clarification of receiver characteristics for multicarrier BTS equipped with multicarrier receiver	-	-	-	-	G1-49	GP-110193	revised	2011-03-03	-	-	2011-03-14
0152	1	A	Rel-9	9.4.0	9.5.0	Clarification of Shifted USF operation in combination with Dual Carrier DL	GP-49	GP-110465	approved	G1	G1-49	GP-110465	agreed	2011-03-03	TEI7	-	2011-03-14
0153	-	-	Rel-9	-	-	Clarification of Shifted USF in combination with EFTA	-	-	-	-	G1-49	GP-110194	revised	2011-03-03	-	-	2011-03-14
0153	1	F	Rel-9	9.4.0	9.5.0	Clarification of Shifted USF in combination with EFTA	GP-49	GP-110454	approved	G1	G1-49	GP-110454	agreed	2011-03-03	TEI9	-	2011-03-14

http://www.3gpp.org/DynaReport/45002-CRs.htm
Release-8, 8.1.0: http://www.3gpp.org/ftp/tsg_geran/TSG_GERAN/GERAN_49_Chengdu/Docs/GP-110464.zip
ETSI Source: https://www.etsi.org/deliver/etsi_ts/145000_145099/145002/08.01.00_60/ts_145002v080100p.pdf

	 Release TS 44.060 Source:https://www.etsi.org/deliver/etsi_ts/144000_144099/144060/08.07.00_60/ts_144060v080700p.pdf
receiving an assignment of at least a first PDCH (packet data channel) and a second PDCH;	The accused product practices receiving an assignment of at least a first PDCH (e.g., first PDCH) and a second PDCH (e.g., second PDCH).

	When Shifted USF operation is used, the USF for the first assigned uplink PDCH shall be sent on the downlink PDCH corresponding to (i.e. with the same timeslot number as) the second assigned uplink PDCH. The MS shall monitor this downlink PDCH for the USF corresponding to both the first assigned uplink PDCH and the second assigned uplink PDCH. If the USF corresponding to the first assigned uplink PDCH is detected then the mobile station shall transmit on the first assigned uplink PDCH and all higher numbered assigned uplink PDCHs. Otherwise, operation shall be as described in sub-clause 8.1.1.2.1. The USF value corresponding to the first assigned uplink PDCH shall be different from the USF value corresponding to the second assigned uplink PDCH. When Shifted USF operation is used, PACCH operation shall be as described in sub-clause 8.1.1.2.2 except that the network shall transmit all PACCH messages on the PDCH carried on the downlink timeslot corresponding to the second lowest numbered timeslot in the uplink assignment, and the mobile station shall attempt to decode every downlink RLC/MAC block on that downlink PDCH. If a PACKET PDCH RELEASE message releases the second uplink PDCH in the current timeslot configuration of a mobile station using Shifted USF operation then the first uplink timeslot shall also be considered released. If any PDCHs remain in the new timeslot configuration then normal USF operation shall continue starting on the lowest available timeslot. https://www.etsi.org/deliver/etsi_ts/144000_144099/144060/08.07.00_60/ts_144060v080700p.pdf 8.1.1.2.1 Uplink PDCH Allocation The PACKET UPLINK ASSIGNMENT and MULTIPLE TBF UPLINK ASSIGNMENT messages assign to the mobile station a subset of 1 to N uplink PDCHs (when the uplink TBF operates in BTTI configuration) or uplink PDCH-pairs (when the uplink TBF operates in RTTI configuration), where N depends on the mobile station multislot class. An uplink TBF that operates in RTTI configuration may receive the assigned USFs either in BTTI USF mode or in RTTI USF mode. The indication of whether BTTI USF mode or RTTI USF mode is to be used is provided during the assignment of the corresponding uplink TBF. https://www.etsi.org/deliver/etsi_ts/144000_144099/144060/06.20.00_60/ts_144060v062000p.pdf
monitoring an assigned PDCH to detect a USF;	The accused product practices monitoring (e.g., reading the header of each RLC/MAC block on a downlink PDCH) an assigned PDCH to detect a USF (Uplink status flag).

	5.2.3 Uplink State Flag An Uplink State Flag (USF) is included in the header of each RLC/MAC block on a downlink PDCH, as specified in clause 10. It may be used by the network to control the multiplexing of different mobile stations and TBFs on an uplink PDCH. The use of USF is further specified in 3GPP TS 45.002. https://www.etsi.org/deliver/etsi_ts/144000_144099/144060/08.07.00_60/ts_144060v080700p.pdf
And transmitting on an assigned PDCH corresponding to the USF, wherein (i) if shifted USF operation is not used then a first assigned PDCH is monitored to detect a USF corresponding to the first assigned PDCH	The accused product practices monitoring a first assigned PDCH to detect a USF corresponding to the first assigned PDCH and transmitting on the assigned PDCH corresponding to the USF if shifted USF operation is not used. The accused product will monitor USF of the downlink PDCH corresponding to the assigned PDCH having the same slot number since there is no shifting operation. **5.2.3 Uplink State Flag** An Uplink State Flag (USF) is included in the header of each RLC/MAC block on a downlink PDCH, as specified in clause 10. It may be used by the network to control the multiplexing of different mobile stations and TBFs on an uplink PDCH. The use of USF is further specified in 3GPP TS 45.002. https://www.etsi.org/deliver/etsi_ts/144000_144099/144060/08.07.00_60/ts_144060v080700p.pdf

8.1.1.2.1 Uplink PDCH Allocation

The PACKET UPLINK ASSIGNMENT and MULTIPLE TBF UPLINK ASSIGNMENT messages assign to the mobile station a subset of 1 to N uplink PDCHs (when the uplink TBF operates in BTTI configuration) or uplink PDCH-pairs (when the uplink TBF operates in RTTI configuration), where N depends on the mobile station multislot class.

An uplink TBF that operates in RTTI configuration may receive the assigned USFs either in BTTI USF mode or in RTTI USF mode. The indication of whether BTTI USF mode or RTTI USF mode is to be used is provided during the assignment of the corresponding uplink TBF.

If a mobile station supports Downlink Dual Carrier, the PACKET UPLINK ASSIGNMENT or MULTIPLE TBF UPLINK ASSIGNMENT message may assign PDCHs (corresponding to any given uplink TBF) on more than one carrier frequency. If this occurs, the Extended Dynamic Allocation procedures shall operate independently on each of the two carriers.

A mobile station that has an uplink TBF operating in BTTI configuration shall monitor the downlink PDCHs corresponding to (i.e. with the same timeslot number as) its assigned uplink PDCHs starting with the lowest numbered PDCH, then the next lowest numbered PDCH, etc., up to the one corresponding to the highest numbered assigned uplink PDCH. A mobile station that has an uplink TBF operating in RTTI configuration shall monitor the downlink PDCH-pairs starting with the one corresponding to the uplink PDCH-pair with the lowest numbered timeslots, then the next uplink PDCH-pair, etc., up to the downlink PDCH-pair corresponding to the uplink PDCH-pair with the highest numbered timeslots assigned to the mobile station. When in dual transfer mode, the network shall not assign uplink PDCHs whose corresponding downlink PDCH cannot be monitored by the mobile station because of the presence of the uplink dedicated channel. As an exception, in the case of dual transfer mode, if the mobile station indicates support of DTM high multislot class capability, the network may also assign uplink PDCHs whose corresponding downlink PDCH cannot be monitored by the mobile station. In this case, the mobile station shall monitor only those downlink PDCHs that are feasible when taking into account the position of the uplink dedicated channel and the switching requirements of its multislot class (see 3GPP TS 45.002).

Whenever a mobile station with an uplink TBF operating in BTTI configuration detects an assigned USF value on a monitored PDCH, the mobile station shall transmit either a single RLC/MAC block or a sequence of four RLC/MAC blocks on the corresponding uplink PDCH (i.e. with the same timeslot number as the downlink PDCH on which the USF was detected) and all higher numbered assigned uplink PDCHs.

The following applies for an uplink TBF in RTTI configuration that receives USFs in BTTI USF mode:

- An assigned USF received on the first PDCH of a monitored downlink PDCH-pair allocates resources for one or four uplink RTTI radio blocks in the first two TDMA frames of the following basic radio block period(s) on the corresponding uplink PDCH-pair and all assigned uplink PDCH-pairs with higher numbered timeslots.

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and (ii) if the shifted USF operation is used then a second assigned PDCH is monitored to detect the USF corresponding to the first assigned PDCH and a USF corresponding to the second assigned PDCH.	The accused product practices monitoring a second assigned PDCH to detect the USF corresponding to the first assigned PDCH and a USF corresponding to the second assigned PDCH (e.g., USF corresponding to both PDCHs are monitored on a second assigned PDCH) if the shifted USF operation is used.

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Note 0	If the downlink timeslots assigned (allocated) to the mobile station are not contiguous, d shall also include the number of downlink timeslots not assigned (allocated) to the mobile station that are located between assigned (allocated) downlink timeslots. Similarly, if the uplink timeslots assigned (allocated) to the mobile station are not contiguous, u shall also include the number of uplink timeslots not assigned (allocated) to the mobile station that are located between assigned (allocated) uplink timeslots.
Note 1	Normal measurements are not possible (see 3GPP TS 45.008).
Note 2	Normal BSIC decoding is not possible (see 3GPP TS 45.008) except e.g. in case of a downlink dual carrier capable MS operating in single carrier mode using its second receiver for BSIC decoding.
Note 3	TA offset required for multislot classes 35-39.
Note 4	TA offset required for multislot classes 40-45.
Note 5	Shifted USF operation shall apply (see 3GPP TS 44.060).
Note 6	The network may fallback to a lower multislot class and may not apply T_{ra}. A multislot class 38 or 39 MS shall in this case use T_{ta} for timing advance values below 31.
Note 7	For dual carrier operation the Applicable Multislot class is the Signalled multislot class or the Equivalent multislot class (if different from the Signalled multislot class) as defined in Table B.2.
Note 8	These configurations can only be used for assignment to an MS supporting Flexible Timeslot Assignment (see 3GPP TS 24.008). For allocation additional restrictions apply.
Note 9	These configurations can be used only in RTTI configuration.
Note 10	These configurations can be used in RTTI configurations only when the timeslots of the corresponding downlink PDCH-pair are contiguous.
Note 11	These configurations can be used only in RTTI configurations when the timeslots of the corresponding downlink PDCH-pair are not contiguous.

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	8.1.1.2.4 Shifted USF operation In some instances (see 3GPP TS 45.002), Shifted USF operation shall apply. When Shifted USF operation is used, the USF for the first assigned uplink PDCH shall be sent on the downlink PDCH corresponding to (i.e. with the same timeslot number as) the second assigned uplink PDCH. The MS shall monitor this downlink PDCH for the USF corresponding to both the first assigned uplink PDCH and the second assigned uplink PDCH. If the USF corresponding to the first assigned uplink PDCH is detected then the mobile station shall transmit on the first assigned uplink PDCH and all higher numbered assigned uplink PDCHs. Otherwise, operation shall be as described in sub-clause 8.1.1.2.1. The USF value corresponding to the first assigned uplink PDCH shall be different from the USF value corresponding to the second assigned uplink PDCH. When Shifted USF operation is used, PACCH operation shall be as described in sub-clause 8.1.1.2.2 except that the network shall transmit all PACCH messages on the PDCH carried on the downlink timeslot corresponding to the second lowest numbered timeslot in the uplink assignment, and the mobile station shall attempt to decode every downlink RLC/MAC block on that downlink PDCH. If a PACKET PDCH RELEASE message releases the second uplink PDCH in the current timeslot configuration of a mobile station using Shifted USF operation then the first uplink timeslot shall also be considered released. If any PDCHs remain in the new timeslot configuration then normal USF operation shall continue starting on the lowest available timeslot. https://www.etsi.org/deliver/etsi_ts/144000_144099/144060/08.07.00_60/ts_144060v080700p.pdf

Note: In case of extended dynamic allocation, the MS needs to support USF monitoring on the downlink PDCHs corresponding to (i.e. with the same timeslot number as) all assigned uplink PDCHs as defined in 3GPP TS 44.060.

In a dual carrier configuration, all the downlink timeslots on both radio frequency channels shall be assigned within a window of size "d" and all the uplink timeslots on both radio frequency channels shall be assigned within a window of size "u" where "d" and "u" are defined in Table 6.4.2.2.1. The maximum number of timeslots that may be assigned depends on the multislot class of the MS (or the Equivalent multislot class if different from the Signalled multislot class as described in B.4).

In a dual carrier configuration, Shifted USF operation shall be determined per carrier according to the number of downlink and uplink timeslots assigned on each carrier.

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